

From the September 2010 EPA Inspection Report for the Apra Harbor WWTP
Identified Sources of Aluminum, Copper, and Nickel

Aluminum – The principal sources of aluminum into the Apra Harbor sewers appear to be excess alum dosing into the drinking water and the discharge of residuals from the Fena water treatment plant to the sewers. Toward the second source, the Navy installed a solids removal system at the water treatment plant to limit discharge to belt filter press filtrate. As a result, the average effluent aluminum concentration dropped over 50% from 0.647 mg/l (2005-2007) to 0.316 mg/l (2008-2010). A further drop below the monthly-average NPDES permit limit of 0.120 mg/l likely would require optimized control of alum dosage rates in order to minimize excess alum in the drinking water supply. It is not clear whether dosing control could be further optimized. Other secondary sources of aluminum might be CHT ships sanitary, the demineralizer plant, and anodic protection. Scheduled monitoring of the non-domestic sources would identify any significant sources.

Copper – The principle source of copper into the Apra Harbor sewers is likely the corrosion of the drinking water distribution pipes and fixtures. The Navy has funded the installation of a corrosion control unit at the Fena water treatment plant to narrow the pH of the drinking water supply to be a slightly alkaline 7.8 to 8.0 s.u.. There are numerous smaller sources of copper which nevertheless may prove to be as significant given the stringent NPDES permit limits. These sources might include CHT ships sanitary, the two bilge oily wastewater treatment units, the FISC fuel reclamation unit, heat exchanger coil and cooling tower corrosion, and vehicle maintenance shops. Scheduled monitoring of the non-domestic dischargers would identify any significant copper sources. Scheduled monitoring of the treatment plant influent would also allow the comparison with other wastewater utilities and determination of trends.

Nickel – The principle source has been identified as internal corrosion of the stainless steel CHT systems on-board ships. There are no other likely significant sources of nickel. It may be possible to form insoluble nickel hydroxides particles for solids contact removal in the sewer lines through targeted pH control of the CHT ships sanitary. One possible method could involve caustic dosing into the wet well of key lift stations handling CHT ships sanitary. Scheduled monitoring of the non-domestic dischargers would identify any other significant nickel sources.

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Comparison of Apra Harbor with Other Ocean Outfalls

The ocean water quality standards for California and Hawaii are similar to those for Guam (~2.9 µg/l copper, ~8.3 µg/l nickel). For these and other toxic metals, both California and Hawaii apply zone-of-initial-dilution factors to the water quality standards for submerged ocean outfall discharges. San Jose has the most stringent limits because the outfall discharges into the shallow end of the San Francisco Bay resulting in a dilution factor under five. East Bay MUD discharges into the deeper portion of the San Francisco Bay resulting in a dilution factor of ten. The others discharge through deep water ocean outfalls which result in double and triple digit zone-of-initial-dilution factors. As a result, the NPDES permits for the deep water ocean dischargers do not apply limits for these toxic metals since there is no reasonable potential to exceed the water quality standards at the edges of their zones-of-initial-dilution.

Copper (µg/l) 2009	Treatment Level	Industrial Pretreatment	NPDES Limit	Effluent			Influent
				Mean	99th%	Max	Mean
USN Apra Harbor	2°	pending	2.9	6.9	14.3	14.8	-
USN Ft Kam ①	3° nitr/denitr	certificate	②	8.6	40.5	51.0	42.0
East Bay MUD	2°	yes	37	8.0	13.3	14.0	-
CCH Honouliuli	advanced 1°	yes ③	②	37.5	-	-	64.5
San Jose	3°	yes	12	2.9	4.4	3.9	150.5
Orange Co	1°/2° blend	yes	②	30.5	48.0	47.6	118.0
LA Co Carson	2°	yes	②	3.1	3.9	4.0	159.5

Nickel (µg/l) 2009	Treatment Level	Industrial Pretreatment	NPDES Limit	Effluent			Influent
				Mean	99th%	Max	Mean
USN Apra Harbor	2°	pending	8.2	10.8	16.7	16.6	-
USN Ft Kam ①	3° nitr/denitr	certificate	②	<10	-	-	<10
East Bay MUD	2°	yes	34	4.5	7.1	8.5	-
CCH Honouliuli	advanced 1°	yes ③	②	3.7	-	-	5.7
San Jose	3°	yes	11	3.3	5.6	5.9	14.1
Orange Co	1°/2° blend	yes	②	14.3	19.5	20.5	15.1
LA Co Carson	2°	yes	②	8.4	11.4	10.6	20.7

① Ft Kam data from 2004-2005

② Mixing zone dilution factor resulted in permit monitoring only.

③ CCHonolulu has a pretreatment program, however Honouliuli handles little industrial flow.

Performance is a function of source controls to minimize influent loadings and the level of biotreatment for solids contact removals. All of the listed outfall dischargers have good pretreatment programs that impose best-available-technology treatment or their equivalent to the industrial wastewater sources into their sewers. USN Ft Kam has a sewer discharge certification program considered functionally equivalent to a pretreatment program. San Jose has the highest removal rates (98% for copper and 77% for nickel) because of tertiary treatment. The lowest removal rates are at the primary and primary/secondary blending plants.